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Record of Decision

Auxiliary Reactor Area-I Chemical Evaporation Pond

Operable Unit 5-10

Idaho National Engineering Laboratory
Idaho Falls, Idaho

DECLARATION OF THE RECORD OF DECISION

Site Name and Location

Auxiliary Reactor Area-I Chemical Evaporation Pond
Operable Unit 5-10
Waste Area Group 5
Idaho National Engineering Laboratory
Idaho Falls, Idaho

Statement of Basis and Purpose

This decision document presents the remedial action selected for the Auxiliary Reactor Area-I (ARA-I) Chemical Evaporation Pond, Idaho National Engineering Laboratory Operable Unit 5-10. This alternative was selected in accordance with the Comprehensive Environmental Response, Compensation, andLiability Act, as amended by the Superfund Amendments and Reauthorization Act, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision was based on the information in the site Administrative Record, which is located in the INEL Technical Library in Idaho Falls, Idaho.

The lead agency in this decision was the U.S. Department of Energy (DOE). The U.S. Environmental Protection Agency (EPA) and the Idaho Department of Health and Welfare (IDHW) participated in scoping the site investigations and evaluating the remedial investigation data. The IDHW concurs with the selected remedy.

Description of the Selected Remedy

The DOE has determined that no further remedial action is necessary at the ARA-I Chemical Evaporation Pond to ensure protection of human health and the environment. This decision is based on the results of the human health and ecological risk assessments, which indicate that conditions at the ARA-I Chemical Evaporation Pond pose no unacceptable risk to human health or the environment. The EPA approves of the DOE decision, and the IDHW concurs.

Declaration

No remedial action is necessary at Operable Unit 5-10 to ensure protection of human health and the environment. A statutory 5-year review will not be required because hazardous substances do not remain onsite above health-based levels. Subsurface conditions and the groundwater pathway need further evaluation; consequently, additional investigations will be conducted in another Operable Unit within Waste Area Group 5.

Signature sheet for the foregoing Record of Decision for Operable Unit 5-10 at the Idaho National Engineering Laboratory by the United States Department of Energy and approved by the United States Environmental ProtectionAgency, with concurrence by the Idaho Department of Health and Welfare. The

operable unit consists of the Auxiliary Reactor Area-I Chemical Evaporation Pond at the Idaho National Engineering Laboratory.

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ACRONYMS AND ABBREVIATIONS

ARA	Auxiliary Reactor Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCA	Consent Order and Compliance Agreement
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Field Office
EPA	U.S. Environmental Protection Agency
FFA/CO	Federal Facility Agreement and Consent Order
FR	Federal Register
IDHW	Idaho Department of Health and Welfare
INEL	Idaho National Engineering Laboratory
ug/kg	micrograms per kilogram
mg/kg	milligrams per kilogram

NCP National Oil and Hazardous Substances Pollution Contingency Plan
NPL National Priorities List

OU Operable Unit

pCi/g picocuries per gram

UCL upper confidence limit

VOC volatile organic compound

WAG Waste Area Group

DECISION SUMMARY

1. SITE NAME, LOCATION, AND DESCRIPTION

The Idaho National Engineering Laboratory (INEL) is a U.S. Department of Energy (DOE) facility that encompasses approximately 2,305 sq km (890 sq mi) in southeastern Idaho. The nearest permanent residents are located in Atomic City (population 34) about 11 km (7 mi) south of the Auxiliary Reactor Area (ARA) facilities. The nearest large population center is Idaho Falls (population 46,000), located approximately 48 km (32 mi) to the east. INEL land is currently classified for industrial and mixed use (restricted agricultural and recreational) by the U.S. Bureau of Land Management. It has been designated as a National Environmental Research Park. The ARA is located in Butte County on the southern portion of the INEL site (Figure 1).

The INEL is part of the Eastern Snake River Plain, a volcanic plateau consisting of a series of basaltic lava flows with sedimentary interbeds. The topography of the INEL is generally flat to gently rolling, with an elevation range of 1,732 m (4,750 ft) to 1,896 m (5,200 ft). The topography at the ARA is relatively flat with a gradual slope to the south. Soils in the vicinity of the ARA are shallow and poorly developed and are composed of windblown (eolian) sediments exhibiting a sandy loam or loamy composition. The majority of the soils are Aridisols with calcic horizons (accumulations of calcium carbonate).

The Snake River Plain Aquifer underlies the INEL and has been designated as a sole source aquifer pursuant to the Safe Drinking Water Act. The depth to the aquifer varies from 61 m (200 ft) in the northern portion of the INEL to 270 m (900 ft) in the southern portion; the depth to the aquifer at the ARA is approximately 183 m (600 ft). Regional groundwater flow is generally to the southwest.

The ARA consists of four separate facilities; ARA-I is the southernmost and oldest facility. The ARA facilities have been used for research reactor operations and support activities. All ARA reactors have been removed, and each facility has undergone partial decontamination and decommissioning. ARA -I was a support facility and has not been used for operations since 1988.

The ARA-I Chemical Evaporation Pond is listed as Operable Unit (OU) 5-10 in Waste Area Group (WAG) 5 under the Federal Facility Agreement and Consent Order (FFA/CO) for the INEL. OU 5-10 is an unlined surface impoundment that was previously used to dispose of laboratory wastewater from building ARA-627 (Figure 2). The pond is now typically dry except after precipitation events. The pond was constructed in 1970 by excavating native soil tocreate a topographic depression. Basalt outcrops are present within the pond and immediately adjacent to the pond. Field sampling conducted on the pond in 1990 found a maximum pond soil depth of 1.1 m (3.5 ft) and an average soil

depth of approximately 0.5 m (1.5 ft). The ARA-I facility is approximately 3 m (10 ft) higher in elevation than the pond. The dimensions of the area sampled were approximately 40 x 140 m (130 x 460 ft), but the ponded area was approximately 20 m (66 ft) in diameter (Figure 3).

2. SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 Enforcement Activities

Under the INEL Consent Order and Compliance Agreement (COCA) signed by the U.S. Environmental Protection Agency (EPA), DOE, and U.S. Geological Survey in July 1987, the ARA-I Chemical Evaporation Pond was classified as a Land Disposal Unit and was listed as COCA Unit ARA-01. Releases of radioactive or hazardous contaminants to the ARA-I Chemical Evaporation Pond were first identified and evaluated during investigations conducted in accordance with the COCA.

In July 1989, the INEL was proposed for inclusion on the National Priorities List (NPL) in 54 Federal Register (FR) 29820. The listing was proposed by the EPA under the authority granted by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986. The final rule placing the INEL on the NPL was published in November 1989 in 54 FR 44184.

In December 1991 the EPA, DOE, and Idaho Department of Health and Welfare (IDHW) signed the FFA/CO. The FFA/CO and Action Plan supersede the COCA and provide schedules and strategies for implementing the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at the INEL. Under the FFA/CO the ARA-I Chemical Evaporation Pond is listed as OU 5-10.

2.2 Site History and Investigations

ARA-I is a surplus facility that was used as a nuclear research area, as research laboratories, and for various operations related to the examination or storage of radioactively contaminated materials. The ARA-I facility is comprised of two main buildings, ARA-626 and ARA-627. ARA-626 was a hot cell used to support materials research, and it contained a small laboratory area for sample preparation and inspection. ARA-626 was not connected to the pond.

ARA-627 served many purposes following its construction in 1955. Between 1955 and 1971, ARA-627 was a print shop. Beginning in 1970, the building was expanded and modified to serve as a research laboratory for materials development and testing. During this expansion, the ARA-I Chemical Evaporation Pond and the waste line from ARA-627 were constructed. From 1970 to 1984, small amounts of volatile organic compounds (VOCs) and mineral acids were used for material testing operations at ARA-627. On rare occasions when large amounts of acids or VOCs were used on a specific project, they were retained and sent to the Idaho Chemical Processing Plant for processing. Small amounts of acids and VOCs were used on a more routine basis and were disposed of in the following manner:

- Radioactively contaminated acids were placed into the radioactive waste sewer and retained in the radioactive waste tank (ARA-729) before disposal.

- Nonradioactively contaminated acids and VOCs were discharged through the waste line to the ARA-I Chemical Evaporation Pond (ARA-745).

In 1980, ARA-627 was further modified to incorporate a radiochemistry laboratory that operated until 1988. The laboratory performed extractions

to determine potential leaching characteristics and concentrations of radionuclides in various waste forms and environmental media. The laboratory testing performed resulted in approximately 95 to 99% of the low-level radioactive material leached from the analytical samples to be retained on filter paper. The contaminated filter papers were periodically sent to the Radioactive Waste Management Complex for disposal. The small amounts of radioactive material not captured on the filter paper and the VOCs used in the extraction process (xylene, heptane, 2-ethyl hexanol, and methanol) were discharged with other laboratory wastewater to the ARA-I Chemical Evaporation Pond. In 1988, the radiochemistry laboratory was moved to the Test Reactor Area; except for janitorial rinsewater from ARA-627 discharges to the pond ceased.

A sampling effort was conducted in 1990 to better characterize the ARA-I Chemical Evaporation Pond in support of Resource Conservation and Recovery Act closure activities under the COCA. Previous characterization activities did not define the extent of contamination; therefore, additional sampling was necessary to better characterize the pond and discharge pipe. The 1990 sampling results are documented in the Remedial Investigation Report for the ARA Chemical Evaporation Pond (Operable Unit 5-10), which is available in the Administrative Record. Upon the signing of the FFA/CO in 1991, the EPA, DOE, and IDHW agreed that these data would be used for CERCLA site characterization and risk assessment.

The sampling strategy developed to detect chemical and radioactive contaminants in the pond sediments was based on process knowledge and a previous investigation that determined limited quantities of materials were discharged over the 17 years of pond use. A total of 25 biased and 23 random sediment samples (including quality assurance samples) were collected at the surface and basalt interface from within the pond and discharge pipe area. Ten biased soil samples were collected approximately 30 m (100 ft) to the south ofthe pond in an area unaffected by ARA activities. These 10 samples were used to determine background metal concentrations (Figure 3).

3. HIGHLIGHTS OF COMMUNITY PARTICIPATION

On June 26, 1992, a document containing proposed plans for three INEL sites, including the ARA-I Chemical Evaporation Pond, was released to the public. The plan was mailed to approximately 6,500 individuals on the INEL mailing list, with a cover letter from the Director of the Environmental Restoration Division, U.S. Department of Energy Idaho Field Office (DOE-ID). The public comment period for the proposed plan was from July 6 to August 5, 1992. Community participation activities have been conducted as required by CERCLA sections 113(k)(2)(B) (i-v) and 117 and part XXIV of the FFA/CO.

The ARA-I Chemical Evaporation Pond proposed plan summarized the results of the human health risk assessment, which was based on modeled exposures to the pond contaminants. The modeling indicated that the contaminants at the site pose no unacceptable risk to human health and the environment. Therefore, the DOE, EPA, and IDHW recommended No Action for the Chemical Evaporation Pond in the proposed plan.

The Notice of Availability for the proposed plan was published in the following newspapers:

- The Post Register (Idaho Falls) - July 1, 1992
- The Idaho State Journal (Pocatello) - July 2, 1992
- Times News (Twin Falls) - July 1, 1992
- Idaho Statesman (Boise) - July 2, 1992
- Daily News (Moscow-Pullman) - July 11 and 12, 1992
- South Idaho Press (Burley) - July 1, 1992

- The Lewiston Morning Tribune (Lewiston) - July 1, 1992.

Copies of the plan are available in the Administrative Record file in the INEL Technical Library, 1776 Science Center Drive, Idaho Falls. Copies of the file also are available in the INEL Information Repository sections of the public libraries in Idaho Falls, Pocatello, Twin Falls, Boise, and theUniversity of Idaho Library in Moscow.

Technical briefings on the proposed plan were held July 13 in Twin Falls, July 14 in Moscow, and July 15 in Pocatello. The Twin Falls briefing was presented to the Twin Falls City Council and was open to the public; the Moscow and Pocatello briefings were presented to the public.

Articles explaining the proposed plan for the ARA-I Chemical Evaporation Pond were printed in the May and July 1992 issues of the INEL Reporter newsletter, which is widely distributed within Idaho. Additionally, during the public comment period (from July 6 to August 5), public meetings on the proposed plan were held in Idaho Falls on July 20, Burley on July 21, Boise on July 22, and Moscow on July 23. An INEL press release informing the public of the upcoming meeting in their area was distributed to state-wide media. Personal phone calls were made by INEL Outreach Offices in Pocatello, Twin Falls, and Boise to inform key representatives from community groups of the opportunity for public comment.

The notices of the times and dates of public meetings were published in the following newspapers:

- The Post Register (Idaho Falls) - July 17, 1992
- The Idaho State Journal (Pocatello) - July 17, 1992
- Times News (Twin Falls) - July 20, 1992
- Idaho Statesman (Boise) - July 20, 1992
- Daily News (Moscow-Pullman) - July 21, 1992
- South Idaho Press (Burley) - July 20, 1992
- The Lewiston Morning Tribune (Lewiston) - July 21, 1992.

At the meetings, representatives from the DOE-ID, EPA, and IDHW discussed the proposed plan, answered questions, and received public comment. Verbatim transcripts of each public meeting were prepared by a court reporter and are available, along with the written comments, in the Administrative Record. Comments received from the public were considered in the final decision and have been summarized and addressed in the Responsiveness Summary attached to this Record of Decision (Appendix A).

4. SCOPE AND ROLE OF OPERABLE UNIT AND RESPONSE ACTION

Under the FFA/CO, the INEL is divided into 10 WAGs; each WAG consists of several OUs. This strategy allows the DOE-ID, EPA, and IDHW to investigate OUs and focus available cleanup resources on those areas that pose an unacceptable risk to human health and the environment. WAG 5 consists of 13 OUs located at the Power Burst Facility and the ARA. As previously stated, the ARA-I Chemical Evaporation Pond is designated as OU 5-10.

OU 5-10 includes the pond sediments and the sediments under the discharge pipe. The data collected to characterize the pond's sediments were used in the remedial investigation baseline risk assessment. This risk assessment indicates the sediments within the Chemical Evaporation Pond and under the discharge pipe pose no unacceptable risk to human health and the environment. Based on these results and risk management considerations, the three agencies agree that the ARA-I Chemical Evaporation Pond requires no remedial action to protect human health and the environment. Any impacts from past releases to the pond that may affect the subsurface (vadose zone)

or groundwater will be evaluated in a future investigation that will be completed before the INEL site-wide Record of Decision is finalized.

5. SITE CHARACTERISTICS

The ARA-I Chemical Evaporation Pond sediments were investigated by DOE for the presence of contamination between 1982 and 1990. Investigations before 1990 indicated that metals, VOCs, and radionuclides existed in the sediments. Samples collected in 1990 were analyzed for metals, VOCs, and gamma- and alpha-emitting radionuclides. Analyses for metals and VOCs were performed as specified in the laboratory manual Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (EPA, SW-846, 1986). Gamma-emitting radionuclides were analyzed by gamma-spectroscopy methods specified in the EG&G Radiation Measurements Laboratory Standard Operating Procedures (Procedure DM-1), and alpha emitting radionuclides were analyzed using the "Total Spectrometric Alpha Determination" procedure used by the Radiation Measurement Laboratory at the INEL. Analytical results for random, biased, and background samples are summarized in Table 1.

Because some of the constituents identified at the site also occur naturally in the soil, it was necessary to determine background concentrations specific to ARA-I. Background samples were taken approximately 30 m (100 ft) to the southeast of the pond. Analysis of these soil samples indicated metal concentrations similar to generally accepted background values for the western United States (EPA, Office of Solid Waste and Emergency Response, Hazardous Waste Land Treatment, SW-874, April 1983).

The pond sediment samples were analyzed for 16 naturally occurring metals. All metals were detected; however, as shown in Table 1, most metal concentrations were at or below the background concentration. The samples with the highest metal concentrations were collected within a 9 sq m (approximately 100 sq ft) area adjacent to the pond inlet (see Figure 2).

A full gamma spectroscopy analysis was performed, only three gammaemitting radionuclides were detected in the pond sediments: cesium-137 (25 of 40 samples), cesium-134 (4 of 40 samples), and cobalt-60 (3 of 40 samples). However, only two samples containing gamma-emitting radionuclides (biased sample and replicate) had detections statistically greater than background radioactivity as determined from samples collected within the WAG 5 area and reported in Environmental Monitoring for EG&G Idaho Falls Facilities at the Idaho National Engineering Laboratory, EG&G-2612(90), August 1991. The maximum concentration of radionuclides in these samples was 297 pCi/gcesium-137, 11.4 pCi/g cesium-134, 8.14 pCi/g cobalt-60, 2.6 pCi/g plutonium-239, and 1.6 pCi/g uranium-234. As with the metals, the samples with the highest radionuclide concentrations were collected adjacent to the pond inlet.

Only one sample was analyzed for alpha-emitting radionuclides. That sample was collected from the area adjacent to the pond inlet, which was the area expected to exhibit the greatest contamination. The alpha-emitting radionuclides, plutonium-239 and uranium-234, were detected at low concentrations in that sample. Although only one sample was targeted for alpha-emitting radionuclides, other data exist that indicate their absence. Specifically, the alpha-emitting radionuclides plutonium-239 and plutonium-241 are co-produced from the decay of a parent compound. Plutonium-241 quickly undergoes radioactive decay (14-year half-life) to produce americium -241, which is a x-ray emitting radionuclide and is detectable by gamma spectroscopy. Gamma spectroscopy analysis was performed on the sediment samples collected throughout the rest of the pond, and americium-241 was not detected. The absence of americium-241 indicates that the parent plutonium-241 and the associated plutonium-239 are also absent, and it supports the assumption that the alpha contamination has limited distribution in the pond

sediments.

Three VOCs (methylene chloride, acetone, and toluene) were detected in the pond sediments. Out of 32 total random and biased samples targeted for VOC analysis, methylene chloride was detected in four samples at concentrations ranging from 8 to 26 ug/kg, acetone was detected in two samples (2 and 7 ug/kg), and toluene was detected in three samples (3 to 4 ug/kg).

The fate and transport of the detected contaminants are affected by a variety of physical and chemical processes. Radionuclides decay and VOCs dissipate; therefore, their concentrations will continue to decrease overtime. Metal contamination (including radionuclides) found in the sediments isrelatively immobile; the primary mode of transport is windblown dust. Metals of potential concern in the sediments are:

- Arsenic, chromium-VI, cesium-137, cesium-134, cobalt-60, plutonium-239, and uranium-234, which are classified as Group A human carcinogens
- Cadmium, a Group B1 probable human carcinogen
- Beryllium, a Group B2 probable human carcinogen
- Chromium-III, a noncarcinogen that may have other adverse human health effects.

At the ARA-I Chemical Evaporation Pond, potential pathways for contaminant migration and exposure to humans include (a) direct atmospheric transport, (b) indirect transport via game animals, (c) direct transport via groundwater, and (d) direct ingestion by workers or future residents. Direct exposure to ionizing radiation emitted by pond contaminants constitutes another exposure route, but it is not a migration pathway. Exposure pathways selected for the risk assessment include soil ingestion, inhalation, direct contact with contaminants, and exposure to direct ionizing radiation.

Potential exposure scenarios based on the above pathways at the ARA-I Chemical Evaporation Pond were limited to present occupational and future residential users. For the occupational scenario, the site worker was assumed to be exposed to direct radiation and to inhale or ingest contaminants from the pond sediments. Currently, exposure to the public is unlikely because of the strict security policy at the INEL. However, a future residential scenario was evaluated because it is possible a home could be built on the site if existing land use policy changes. Residential exposures may occur by inhalation, ingestion, dermal contact, or direct radiation exposure. For the risk assessment, it was assumed residential development will not occur for at least 30 years. A 100-year residential scenario was also evaluated consistent with previously published FFA/CO investigations.

6. SUMMARY OF SITE RISKS

6.1 Human Health Risk

The contaminants found in the ARA-I Chemical Evaporation Pond were evaluated to identify those that contribute the greatest potential risk. A concentration-toxicity screen was used, which involved ranking each contaminant by its highest detected concentration multiplied by a chemicalspecific risk factor developed by the EPA. Consistent with EPA guidance (Risk Assessment Guidance for Superfund, Part A), contaminants contributing more than 1% of the total calculated risk were retained in the

baseline risk assessment. The concentration-toxicity screen identified chromium-III as the main contributor of noncarcinogenic risk, while the most significant carcinogenic risk drivers were chromium-VI, cadmium, beryllium, arsenic, and radionuclides (Table 2).

Table 2 gives the concentrations of the contaminants in the ARA-I Chemical Evaporation Pond that were used in the baseline risk assessment for each scenario. Initial concentrations of contaminants measured in the pond sediments were used to calculated the 95% upper confidence limit (UCL) for each identified risk driver. Calculation of the 95% UCL is based on an apparent lognormal distribution on analytic results, using a one sided t-test. For assessment of risk, the mean background concentration was then subtracted from the associated UCL, and the resulting value was used for risk modeling. For nonradioactive analytes and long-lived radionuclides, concentrations are considered to remain constant with time. The nonradioactive material may deteriorate over time, but the decay is neither constant nor predictable. Radioactive material decays at a predictable rate, but the activity reduction experienced by a longlived radionuclide during a 30- or 100-year period would be insignificant.

The human-health effects of the contaminants were evaluated for current occupational and future residential scenarios (30 and 100 year). Two risk assessments for each scenario were developed: the first using EPA default parameters and the second using site-specific parameters. ARA-I is a surplus facility that is not normally occupied. Therefore, occupational direct radiation and ingestion exposures were modeled for an individual who would spend 2 hours at the site every 90 days. Occupational inhalation exposure was modeled for an individual who spends 1 day/week at ARA-I[100 m (328 ft) from the pond].

Residential carcinogenic risks were calculated for both the 30- and 100-year future-use scenarios for site-specific and default parameters. The timing of the residential scenario is not important to the chemical risk assessment, but it is considered in the radiological risk assessment because radionuclide decay reduces risk over time. Residential exposure at the site may occur by inhalation, ingestion, dermal contact, or direct radiation exposure.

Each scenario was assessed using EPA default exposure parameters to establish a baseline risk value. Site-specific risk assessment reflects site conditions as they exist today and as they are likely to exist in the future. The major difference between the default and site-specific conditions is the exposure frequency; a lower frequency is more realistic for this site. The baseline risk assessment is included in the Remedial Investigation Report for the ARA Chemical Evaporation Pond (Operable Unit 5-10).

Contaminant intake rates for metals and radionuclides were calculated for inhalation, ingestion, and dermal absorption in accordance with EPA methods found in the Risk Assessment Guidance for Superfund, Volume I, "Human Health Evaluation Manual." For noncarcinogens, the calculated contaminantintake rates and absorbed doses for each contaminant and exposure route were compared to EPA reference doses. The hazard quotients (the ratio of the calculated intake to the reference dose for each contaminant) were summed by exposure route and scenario to obtain the hazard indices. A hazard index value greater than 1 indicates possible adverse human-health effects for sensitive subpopulations. For the modeled scenarios, no hazard indices greater than 1 were identified. This indicates the noncarcinogenic contaminants at the ARA-I Chemical Evaporation Pond pose no unacceptable risk to human health (Table 3).

Carcinogenic health effects for each scenario were evaluated in accordance with EPA methodology using calculated intake rates and absorption and slope factors for each carcinogen. The results were the calculated excess cancer risks for each carcinogen. These risks were then summed to determine the total excess cancer risk for that scenario. For the occupational scenario, the current total carcinogenic risk to workers near the ARA-I Chemical Evaporation Pond was 2 in 100,000 (2 x 10[-5]) using the default parameters and 2 in 10,000,000 (2 x 10[-7]) using site-specific parameters. For the default 30-year future residential scenario, the total carcinogenic risk from radionuclides and inorganic metals was 1 in 100,000 (1 x 10[-5]) and 2 in 1,000,000 (2 x 10[-6]) for the site-specific scenario. For the 100-year future residential scenario, the total carcinogenic risk for the default scenario was 4 in 1,000,000 (4 x 10[-6]) and 1 in 1,000,000 (1 x 10[-6]) for the site-specific scenario (Table 3).

In summary, noncarcinogenic contaminants resulted in a hazard quotient of less than 1 for the occupational and residential scenarios. The calculated excess risk of carcinogenic effects from exposure to the chemical and radioactive contaminants in the pond sediments from all routes of exposure was within or below the EPA's target risk range of 1 in 10,000 (1 x 10[-4]) to 1 in 1,000,000 (1 x 10[-6]). The greatest potential for carcinogenic effects to both workers and future residents was from exposure to direct ionizing radiation. These calculated probabilities are within or below the acceptable risk range (10[-4] to 10[-6]) for increased cancer incidence as specified in the NCP.

Several sources of uncertainty, such as those associated with sampling and analysis or the use of EPA established toxicity values, are common to risk assessments and generally have a low potential for adding uncertainty to the results. Other assumptions specific to the ARA-I Chemical Evaporation Pond are more important to analysis of uncertainty. These assumptions include the use of all contaminants detected in the pond in the risk assessment, which may increase the risk. However, using EPA-approved methodologies, such as toxicity-concentration screening, removes many metals and VOCs from consideration in the risk assessment. The toxicity screen has a small probability of underestimating the risk. Another source of uncertainty is which samples were used in the risk assessment. For the ARA-I Chemical Evaporation Pond, all samples (both random and biased) were used. The use of biased samples should overestimate total contaminant concentrations in the pond, thus, making the risk assessment more conservative. Perhaps the most important assumption affecting the risks associated with the pond is that a residence would be located at the pond site in the future. Because of conditions at the pond the probability of a residence being located in close proximity to the pond is quite small. The limited areal extent of contamination and the improbability of future residents spending significant time in the area indicates that the potential risks have probably been overestimated.

Because the potential effects of the assumptions used in the risk assessment are not quantified, it is difficult to measure the effect on total risk. However, the potential for over-and underestimation can be qualitatively compared. On balance, it appears there is a greater potential for overestimation of exposures and risks. Therefore, the estimates of total risk for this site can be considered conservative.

6.2 Environmental Risk

The remedial investigation also addressed the effects the contaminants in the ARA-I Chemical Evaporation Pond sediments would have on the environment. The main contaminants of concern are metals and radionuclides, which typically are immobile in the soils and unlikely to be transferred through

the food chain. The contamination in the pond has a limited distribution; therefore, any effect that could be identified would be on an individual and not on a population or community. These factors, combined with the discontinued use of the pond, semi-arid climate, sparse vegetation, and limited habitat for wildlife, minimize risks to the ecosystem. However, environmental risk will be further evaluated in the WAG 10 Comprehensive Remedial Investigation/Feasibility Study scheduled to begin in 1998.

7. DECISION

The DOE has determined no further remedial action is necessary at the ARA-I Chemical Evaporation Pond to ensure protection of human health and the environment. This decision is based on the results of the human health and ecological risk assessments that determined conditions at the site pose no unacceptable risk to human health or the environment. The EPA approves of the decision and the IDHW concurs.

8. EXPLANATION OF SIGNIFICANT CHANGES

The proposed plan for the ARA-I Chemical Evaporation Pond sediments was released for public comment on June 26, 1992. The proposed plan identified No Action as the alternative preferred by the DOE, EPA, and IDHW. The three agencies have reviewed and considered all written and verbal comments concerning the proposed action that were submitted during the public comment period. The agencies determined that no significant changes to the preferred alternative, as presented in the proposed plan, were necessary.